

UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

FIREMAN'S FUND INSURANCE COMPANY,
As Subrogee of Hodan Properties, Inc.
Plaintiff

Vs.

FIRE SYSTEMS, INC.,
FIRE SUPPRESSION SYSTEMS OF
NEW ENGLAND, INC.,
PRO CON, INC.
and BRIERE & PAQUETTE, INC. f/k/a
PAQUETTE ELECTRIC CO., INC.,
Defendants

CASE NUMBER 04-11578 PBS

SUPPLEMENT TO
FIRE SYSTEMS, INC.'S EXPERT DISCLOSURE

The defendant, Fire Systems, Inc., pursuant to Fed. R. Civ. P. 26(a)(2), supplements its expert disclosure to provide the following additional information concerning previously identified expert: Thomas Klem, T.J. Klem and Associates.

Mr. Klem is expected to testify in accordance with his supplemental report which is attached as **Exhibit 1**.

In addition, the defendant supplements its disclosure to include Mr. Klem's updated curriculum vitae (**Exhibit 2**) and rate schedule (**Exhibit 3**).

FIRE SYSTEMS, INC.

By its Attorneys,

MORRISON MAHONEY LLP

/s/ Gordon L. Sykes

Gordon L. Sykes, BBO #555580
10 North Main Street
Fall River, MA 02720
(508) 677-3100

CERTIFICATE OF SERVICE

I hereby certify that this document filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) and paper copies will be sent to those indicated as non registered participants on May 12, 2006.

/s/ Gordon L. Sykes

EXHIBIT “1”

SUPPLEMENTAL REPORT
AUTOMATIC SPRINKLER ANALYSIS
SPRINKLER FREEZE
MARRIOTT RESIDENCE INN
181 FAUNCE CORNER ROAD
NORTH DARTMOUTH, MA
T. J. KLEM AND ASSOCIATES, LLC
24 ROBERT ROAD
STOUGHTON, MA 02072
781 344-1115
May 12, 2006

Since submitting our November 2003 initial analysis of the automatic sprinkler freeze at the Marriott Residence Inn in Dartmouth, MA, T. J. Klem and Associates, LLC, has had the opportunity to review additional documents (see attached list including witness depositions and fire alarm contractors testing materials, etc.), conduct an additional site visit, review several additional expert reports, review relevant portions of national consensus fire protection documents (NFPA 13, *Installation of Sprinkler Systems*, 1996 edition and NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1995 edition, NFPA 72, *National Fire Alarm Code*, 1996 edition), review the relevant portions of the Massachusetts building and fire codes (780 CMR Massachusetts State Fire Code, sixth edition and 527 CMR Board of Fire Prevention Regulations), and finally, participate in two mediation sessions. This report supplements our initial findings and conclusions, places into perspective major deficiencies in the adequate installation, testing and required recordkeeping for fire protection systems within Massachusetts, the lack of documentation of compliance with the construction project specifications including the Marriott Design Standard, and further, the report addresses the determinations/conclusions of others regarding the automatic sprinkler freeze at the Marriott.

Adequate design, installation and testing of fire protection systems are governed by Massachusetts building and fire codes and the national, consensus fire protection standards that they reference. Compliance with these codes includes a requirement that various tests, inspections, etc. of the installation of fire protection systems be conducted and further requires reporting of this acceptance testing, etc., by the installer. Section 903.4 of the sixth edition of the Massachusetts Building Code and further supported by sections 906.9 and 917.10 require that these tests be carried out in accordance with the testing methods provided in the building code and in the referenced NFPA standards (including NFPA 13 for the sprinkler system and NFPA 72 for the fire alarm system). These referenced standards, along with the building code, require the authority having jurisdiction be notified of the acceptance testing so that they may be present to witness and signoff on the tests. Further, section 903.4 of the building code requires that the authority having jurisdiction witness the complete inspection testing of the fire protection systems or “accept a final performance acceptance test from a Registered Professional Engineer or other legally recognized professional”. The project specifications provided by PCI Architecture for the Marriott also include requirements for the testing to be witnessed; the testing of the fire alarm and detection systems is required to be completed in the presence of the “Public Authority” and “Marriott’s Fire Protection Department” (as specified in Section 13850) and the fire suppression systems tests are stipulated to be observed by “Marriott’s Fire Protection Department” and a “Factory Mutual Representative” (as stated in Section 13900).

Among other goals achieved by compliance with the requirements for these life safety systems is that the expected operation and performance of the systems during a fire

emergency is dependable. This expected performance is reflected within the scope of NFPA 25, section 1-1 (1995 edition), "This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard." This section of the standard is relevant because the fire protection systems at the Marriott had recently been installed and subsequent inspections, etc. were underway. Thus, without being in full compliance with the installation, inspection and testing requirements as well as the required recording of these tests and inspections, etc., the fire protection systems at the Marriott did not have the intended degree of reliability and dependability that is achieved by compliance with Massachusetts Laws. Based on the records that we have reviewed to date of the design, testing, inspection and installation of the automatic sprinkler system and the fire alarm system and further based on our onsite observations of these fire protection systems, we find that the installation of these fire protection systems and the testing and inspection of their installation were flawed, inadequate and directly impacted conditions leading to the sprinkler freeze at the Marriott.

From the documentation reviewed to date along with the two visits to the site, we find that the initial sprinkler installation by Fire Suppression Systems of New England (FSSNE) was faulty in many ways. During our first site visit we observed various sprinkler pipes of the dry sprinkler system in the attic to be incorrectly pitched (i.e. incapable of draining back to the sprinkler riser). Sprinkler piping within dry pipe sprinkler systems is required to be pitched towards a drain to facilitate the drainage of the system. This is a critical aspect for a dry system since the system will be installed in

areas subject to freezing temperatures. With the piping in the configuration that was observed at the Marriott (i.e. incorrect pitch), water introduced into the dry sprinkler system during the reported initial acceptance testing would have remained trapped and unable to be drained at various sections of the sprinkler piping (as previously reported in the November 2003 report).

In proper installations of dry sprinkler systems, portions of sprinkler piping that cannot be drained to the “main drain” are required to have auxiliary drains installed. There are draining provisions for small quantities of water from such sprinkler piping (i.e. under 5 gallons) and provisions for auxiliary drains for such piping containing greater than 5 gallon capacities (i.e., requiring a drum drip drain). It is noteworthy that after the January 19, 2003 incident occurred, an auxiliary drain (drum drip) was added to the system in the area of the freeze by FSSNE.

Furthermore, during the second site visit, a sprinkler pipe within the attic of the Marriott was observed to be unconnected to a water source. This is a serious fault because the sprinklers located on this water line would be incapable of operating during a fire incident and the concept of “full automatic sprinkler coverage” is violated. There are also deficiencies noted on the Fire Systems, Inc. (FSI) testing reports of November 2002 and January 2003 regarding the sprinkler system. These include sprinkler heads in the wrong locations, a butterfly valve not working, the 2” drain leaking, an inoperable pull station, etc. Of particular interest is the comment on the FSI November 2002 test report that states “the alarm test line has no handle on it” indicating that testing of the alarm device by utilizing the bypass test arrangement would not be possible.

Also, during our site visits we were unable to locate a compliant inspector's test connection for the dry sprinkler system. This is yet another critical flaw with the installation of this system. Section 15300 of the project specifications provided by PCI Architecture for the Marriott details that the inspector's test assemblies be located at the remote ends of the systems and piped to drains that discharged outside of the building within 6" of the ground. Dry sprinkler systems are required to contain an inspector's test connection to simulate the activation of one sprinkler as stated in section 4-15.4.3 of NFPA 13. The inspector's test connection is required to be located at the highest and most remote point on the dry sprinkler system. This connection is also utilized to assess the duration of time for water to reach the test outlet after it has been opened. Based on testimony provided by Jacinto Medeiros of FSSNE, it appears that an auxiliary drain (a 1" ball valve with a spigot connection) located within the maintenance room on the third floor of the building was inappropriately utilized for this purpose. Further, representatives of FSSNE admitted that there was no inspector's test connection at the highest and most remote portion of the attic as is required. The installed "auxiliary drain/inspector's test" was not arranged per the requirements of NFPA 13 (section 4-15.4.3) or the Marriot project specifications for a dry pipe trip test connection nor would it have been capable of simulating the flow of one attic sprinkler head. Further, because this auxiliary drain is reported to also function as a low point, it would have been required to be installed as a drum drip drain if the trapped sections of piping that it served were greater than a 5 gallon capacity, as mentioned earlier.

Moreover, there are inconsistencies in the reporting of the results from the initial acceptance tests conducted by FSSNE of the automatic sprinkler systems within the

Marriott. As previously stated, the dry system trip test involves recording the time for a continuous stream of water to reach the inspector's test connection. The maximum allowable time for water to reach the test outlet as provided by Section 15350 of the project specifications provided by PCI Architecture for the Marriott is 60 seconds. Prior to water reaching the outlet, the alarm valve on the dry system must first operate. FSSNE reports that the time for water to reach the test outlet was 45 seconds and the time to trip through the test connection was 50 seconds. They also indicate that the pressure switch operated in 45 seconds. These results are suspect (or erroneous at best) because it is not possible for water to reach the test connection prior to tripping the valve nor can the alarm pressure switch operate before the valve has tripped.

In addition, the Contractor's Material and Test Certificate for Aboveground Piping supplied by FSSNE is signed by both Chief McNamara (Fire Chief of Dartmouth District 3, i.e. the authority having jurisdiction) and a representative from FSSNE (apparently Christopher Paquin as indicated in David Bouchard's expert report) on January 17, 2002 (it appears that this was at the conclusion of the required hydrostatic testing for the sprinkler system installation). This date was several months prior to the sprinkler system being further tested (etc.), left in service with all control valves open (May 17, 2002 as indicated on the certificate) and also the dry system trip test being conducted (based on deposition testimony by Jacinto Medeiros of FSSNE). It is not definitive who the representative was that performed the dry valve trip test at the Marriott because both Medeiros and Charles Higgins of FSSNE indicate in their depositions that they were not present for the test. It is possible that Paquin performed the testing because his signature appears on the test certificate; however we have not reviewed any additional

documentation to verify his presence, the extent of the testing and identification of who witnessed the acceptance testing. Furthermore, there has been no documentation provided to us that substantiates the fire chief being present during the dry system trip test or certification from a professional engineer that the complete testing and installation of the system was code compliant. Additionally, there are no records of anyone from Marriott's Fire Protection Department or Factory Mutual witnessing the tests as required by the project specifications. Finally, during an interview with T. J. Klem and Associates, Chief McNamara could not recall being present during the testing of the entire fire alarm and sprinkler systems. Additionally, when Chief McNamara signed the Occupancy Permit, he indicated that the "smokes" were "ok" however there was no mention of the condition of the sprinkler systems, i.e. the results of the sprinkler acceptance testing.

From the reporting of the initial acceptance tests, we cannot conclude that the dry sprinkler system was initially tested within the requirements of the Massachusetts Building Code, Marriott acceptance and testing requirements (section 15350 of the PCI Architecture project specifications) and NFPA 13 or that all sprinkler and attached alarm devices operated properly. In summary, the data presented on the certificates is flawed and there is no support that the tests were witnessed by the Dartmouth Fire Chief, registered professional engineer or owner's representative or conformed to the Marriott Fire Protection Department's acceptance testing requirements. As a result, it cannot be established that installation of the fire protection systems were code compliant, that the pressure switches on the dry sprinkler system were initially installed correctly or that the switches functioned properly during acceptance testing (as suggested by others).

Further, the completion forms for the fire alarm system provided by TEC Control Systems, Inc. are not signed by the authority having jurisdiction (Chief McNamara), (or others) raising questions about the completeness/thoroughness of the fire alarm system testing and acceptance. It is required by section 903.4 of the building code that the Authority Having Jurisdiction (the Dartmouth Fire Chief) be present for the acceptance testing or utilize acceptance test reports provided by a professional engineer to certify the system, however there is no documentation to suggest that either occurred. (See also James Rogers' expert report for further details regarding adequate design, testing, etc., of the fire alarm system installed within the Marriott.)

Additionally, we find the conclusions of fire expert David Bouchard regarding FSI tripping the dry system and subsequently rewiring the switches to be flawed and unsupportable. Mr. Bouchard postulates, in summary, that FSI tripped the dry valve on January 16, 2003 during one of FSI's quarterly inspections. Mr. Bouchard theorizes that after the valve was tripped FSI personnel had to rewire the low pressure supervisory and alarm pressure switches in order to be able to reset the fire alarm panel. It is important to note that Mr. Bouchard's theory assumes that the pressure switches were wired correctly before the valve tripped. Had FSI tripped the dry valve, as postulated under the conditions assumed by Mr. Bouchard, there would have been an alarm record for the activation of the alarm devices for the dry pipe sprinkler system within the fire panel history (a print out of the alarm history is within the documents reviewed for this incident). However, there is no such recording of an alarm in the alarm records for the property on the date of FSI's January inspection.

FSI had a maintenance and testing contract with the Marriott for the automatic sprinkler and fire alarm systems within the building. The contract provided for: "... a random sampling of devices tested during each visit so that the entire systems is (sic) tested at the end of each contract year." Section 1-2.1 of NFPA 25 allows for variations from its requirements, testing (etc.) as long as the variations are providing "an equivalent level of system integrity and performance".

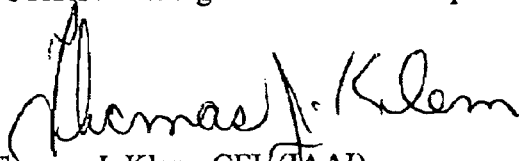
In conclusion, the incident on January 19, 2003 at the Residence Inn in North Dartmouth, Massachusetts was the result of numerous deficiencies within the sprinkler and fire alarm systems that had existed since the systems' installation. FSI "inherited" fire protection systems that were not in full compliance with the laws of Massachusetts. Because of these deficiencies the expected level of performance of these systems could not be ensured nor could the adequacy of their performance be considered dependable or reliable as should be expected of life safety systems.

The improper pipe pitch enabled water from initial acceptance testing to remain within the sprinkler piping in the attic area. The five days prior to the freeze and including January 19, 2003, were the first period of sustained, below freezing conditions that the sprinkler system had been exposed to since its installation. (There were other days scattered here and there that were below freezing; however this was the first extended period where the temperature did not rise above freezing for several days.) Due to the extended cold period and the sprinkler pipes' proximity to the exterior wall and soffit vents, the residual water within the piping (from the initial acceptance tests) froze and expanded, eventually causing a fitting to crack and rupture.

Additionally, we find that the incorrect wiring of the pressure switches for the dry sprinkler system most likely occurred during their installation and wiring to the fire alarm system. We do not find adequate records that the fire alarm system components were tested and witnessed by the authority having jurisdiction, etc. Compliance with these requirements would have identified the incorrect wiring of the switches at the time of acceptance testing. The incorrect wiring remained present in the switches when the continued maintenance of the systems was begun in November by FSI and thereafter.

There is no evidence to support that FSI tripped the dry system or rewired the pressure switches as has been theorized. The numerous faults/violations observed to exist on both the sprinkler and fire alarm systems lead us to conclude that the sprinkler freeze was directly related to the incompetent/noncompliant installation of the systems.

The analysis and opinions expressed in this report are based on my knowledge of facts and information as of the date of this report. If additional data becomes available, we reserve the right to amend this report.



Thomas J. Klem, CFI, (IAAI)
Fire Protection Engineer, MScFPE
T. J. Klem and Associates, LLC

Documents Reviewed Since Last Report

1. Deposition of Charles Barrett
2. Deposition of John Palmer
3. Deposition of Scott Duplisea
4. Deposition of Jacinto Medeiros
5. Deposition of Charles Higgins
6. Deposition of Cory Rogers
7. Deposition of Michael Zurowski
8. Interview of John McNamara by Mike Handler – 10/26/05
9. FSSNE Site Videotape of 1/19/03
10. FSSNE Invoice dated 1/29/03
11. FSSNE Work Orders dated 1/20/03, 1/21/03, 1/22/03, 1/23/03
12. Facsimile dated 8/26/02 from FSSNE to Pro Con, Inc. regarding Fire Protection Test Certificates
13. Letter from FSSNE to Marriott dated 1/22/03
14. Notes dated 1/22/03 regarding Resetting the Sprinkler System
15. Copy of Building Permit
16. TEC Control Service Inc. – Certificate of Completion
17. TEC Control Service Inc. – Job Work Order dated 1/16/03
18. Weather Data from November 2002, December 2002, and January 2003
19. Plaintiff Fireman's Fund Insurance Company's Rule 26(a)(2)(A) Disclosure of Expert Witness
20. Marriott Design Standard – Module 14, Fire Protection/Life Safety
21. PCI Architecture, A Division of Pro Con Inc., Project Specifications – Sections 13850, 13900, 15300, 15315, 15325, 15350
22. Supplemental Expert Report – Richard R. Papetti
23. Expert Report – David R. Bouchard

Codes and Standards Reviewed

780 CMR Massachusetts State Fire Code, sixth edition
527 CMR Board of Fire Prevention Regulations
NFPA 13, *Installation of Sprinkler Systems*, 1996 edition
NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1995 edition
NFPA 72, *National Fire Alarm Code*, 1996 edition

EXHIBIT “2”

Thomas J. Klem, MScFPE
Fire Protection Engineer
Certified Fire Investigator, CFI (IAAI)
24 Robert Road
Stoughton, MA 02072
781-344-1115

Experience

1994-Present

T. J. Klem and Associates, LLC, Stoughton, MA

Owner and principal engineer. T. J. Klem and Associates, LLC is a full service fire protection engineering firm, providing expert consultation of diverse fire protection matters, including fire protection system performance, flammable and combustible liquid hazards assessment, pressurized vessel explosions (both combustible and non-combustible), natural gas leak assessments, fire origin and cause determination, fire growth and spread dynamics, and compliance with national (such as NFPA and ASTM), state and local fire and building codes and standards.

Analyses have utilized fire protection engineering principles and methods, such as volumetric flow rates of materials, energy release rates, explosion venting and building reaction calculations, ease of ignition determination, and active and passive fire protection system intervention regarding life safety and building protection strategies. Such assessments also have utilized nationally developed and recognized computer fire models (FDS, CFAST, DETACT, etc.) to predict detector and sprinkler activation times, fire growth rates, flashover times and fire ignition probabilities of adjacent materials (ie furniture, interior finish, clothing, etc.). Fire protection analyses have been of a wide range of occupancies/protection issues including one million sq. ft. warehouse, high-pile rack storage, restaurant vapor exhaust systems, multiple-fatality single-family and public assembly incidents, BLEVE of oxygen and compressed gas vessels, and arson-murder incidents where quantifying fire protection systems and fire growth rates were vital determinations. After origin and cause determinations have been made, applied research of fire scenarios has been utilized to complement other forms of analysis. Applied research of ignition phenomenon involving combustible liquid portable heaters and stoves, heat flux determinations of heating appliances necessary for adjacent material ignitions, fuel geometry considerations for combustible and flammable liquid ignition, and the ease of ignition of various clothing/materials items ignitions has been performed.

Appointed "fire expert" by Chief Federal Judge in order to provide counsel and report on fire safety findings based on the analysis of a detention center within a high-rise building complex. Lectures on fire protection engineering topics to various technical groups throughout the country, including IAAI chapters, fire safety groups, etc. Volunteers to assist local and state fire investigators on various fire protection engineering issues.

Page two: Curriculum Vitae of Thomas J. Klem

1982-1994	<u>National Fire Protection Association, Quincy, MA</u> Director, Fire Investigations (Chief Fire Investigator). Oversaw the association's aggressive fire investigations program. Analyzed technically significant fire occurrences and integrated results into ongoing association standards-making, resulting in meaningful changes in codes and advancement of the state of the art of fire protection and life safety. Prepared and directed dissemination of technical reports to the fire protection community. Integrated state-of-the-art technology into program and among key engineering staff. Selected to represent the association on technical matters to outside organizations including DOT Committee on Aircraft Fire Safety, the national media, and in testimony before the United States Congress. Frequent guest lecturer to fire protection community and federal law enforcement agencies.
1976-1982	<u>United States Fire Administration, Washington, D.C.</u> Investigative Officer, National Fire Data Center and Office of the Administrator. Managed the Administration's major fire investigations and applied research fire study programs. Selected to provide information and testimony to Congress and key government agencies regarding topical fire protection issues. Developed national fire investigative protocols for electrical fires, fires involving thermal insulation, and manufactured home fires.
1966-1976	<u>Prince George's County Fire Department, Upper Marlboro, MD</u> Served in various positions with steadily increasing responsibility, up to Executive Officer to the Fire Chief, accountable for department management and development of long-range planning. As Captain, Operations and Engineering Division, and Captain, Hazardous Materials Division, had responsibility for developing standard operating procedures and fire code enforcement and interpretation. Also served as firefighter, fire sergeant, fire inspector and fire investigator.
Education	B.A., Fire Protection, University of Maryland M.S., Fire Protection Engineering, Worcester Polytechnic Institute Certified Fire Investigator (CFI), International Association of Arson Investigators
Professional Memberships	Professional Member, Society of Fire Protection Engineers (National) Member, Society of Fire Protection Engineers (New England Chapter) Member, International Association of Arson Investigators

Page three: Curriculum Vitae of Thomas J. Klem

Memberships Member, National Fire Protection Association (NFPA)
Member, NFPA Technical Committee on Telecommunications and Chair,
Fire Prevention, Pre-Fire Planning and Emergency Response and Recovery
Sub-Committee
Associate Member, International Association of Fire Fighters, Local 1619,
Retired, Prince George's County Fire Fighters

EXHIBIT “3”

T. J. Klem & Associates, LLC

CONSULTING FIRE PROTECTION ENGINEERS

CERTIFIED FIRE INVESTIGATORS

Thomas J. Klem

email: tjklemaol.com

May 9, 2006

To whom it may concern:

The billing rates for Thomas J. Klem for the analysis of the automatic sprinkler freeze at the Marriott Residence Inn, in Dartmouth, MA are \$175/hr. (plus expenses) and \$225/hr. for depositions and court appearances.

Thomas J. Klem

President

T. J. Klem and Associates, LLC